Title: *Neutral Polar Wind*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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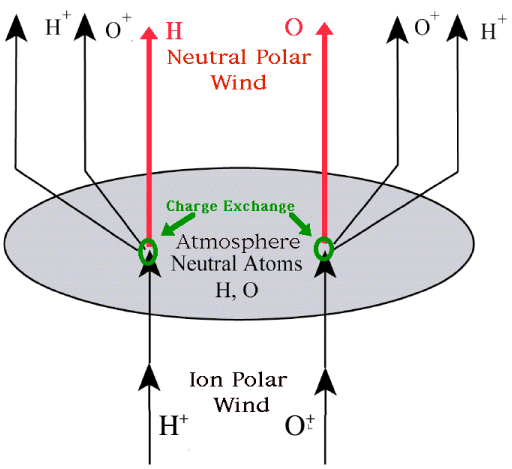
- **Neutral Polar Wind**

In addition to the well established high latitude outflow of ionization from the Earth called the polar wind, the USU SECTP group has now demonstrated that an outflow of neutral atoms also takes place and has begun to model its characteristics. The Earth's magnetic field lines in the polar regions extend deep into the vacuum of interplanetary space and, as a consequence, the magnetic field constrained charged particles, H^+ and O^+, produced in the ionosphere can escape outwards - the H^+ ions in the polar wind accelerating to supersonic speeds. During this motion, the upward moving ions undergo charge exchange reactions with the background neutral atmosphere, to produce an upward moving polar wind of neutral species.

The calculation shows that there is a large outward flux of H that, along with the heavier O that does not escape the pull of Earth's gravity, is a significant source of magnetospheric populations of neutral atoms. They could be the source of the very low energy populations of the energy spectra measured by the Low Energy Neutral Analyzer (LENA) on NASA's Image spacecraft. Similar processes can be anticipated to occur at other planets, such as Mars and Venus where ionosphere escape to interplanetary space occurs. This is another example of how SECTP studies are closely coupled to NASA missions and future explorations.



Neutral Outflowing Particles Produced as Polar Wind Ions Traverse the Background Neutral Atmosphere.

Gardner, L. C. and R.W. Schunk, Neutral Polar Wind, *J. Geophys. Res. Vol. 109*, A0531, 1029/2003JA010291, 2004.